SERVICE MANUAL

*Machine: PP**

Manual No: 119036

Edition 2008B

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1 General information and technical data

Service manual scope

General

This manual describes the service procedure for ATLET Low Picking Truck PP*. Use the manual for quick and correct service of respective truck models.

You may find inconsistencies in the manual compared to the models supplied due to optional designs, upgrades and the like.

⚠ ***Warning!***

If the truck is rebuilt after delivery or supplemented in such a manner that safety may be compromised, ATLET or its authorised representative must be contacted.

Any modifications to the truck are only permitted by authorised personnel. Only in cases where a truck manufacturer is no longer a going concern and where no other company has taken over the operations of said truck manufacturer may the user change or modify the truck, and then only providing the user:

- Arranges that the modification or change is designed, tested and implemented by one or more industrial truck experts, and includes the safety aspect.
- Prepares and keeps permanent documentation covering design, tests and implementation of the modification or change.
- Approves and makes appropriate changes to identification plate, decals, markings and in the instruction manuals.
- Attaches a permanent and clearly visible sign or similar that details the way in which the truck has been modified or changed together with the date of the modification or change and the name and address of the organisation that carried out the task.

 The material has undergone careful examination with regard to correctness. We reserve the right to make alterations. In the event of contradictory information in the Swedish and translated editions, it is the Swedish edition that applies.

Modifications and updates will be distributed via ATLET AB Service Manual Change.

Scope of P series

This manual covers the Low Picking Trucks PPC, PPD, PPL, PPF and PPS. For a description, see Table 1.1 “Truck designations” on page 10.

How to use the manual

Structure

The manual is arranged according to the same principles as ATLET's spare part catalogues, with the truck divided into one subsystem per Tab.

Tabs 1-3 in this manual contain comprehensive information regarding technical data, service instructions and tools.

Tabs 4-12 in the manual contain information limited to a specific part of the truck dealing with the mechanical operation of the various components, for example, Masts (Tab 6) and Hydraulic System (Tab 8).

The software is described under Tab 10.

The main principle for extra accessories is to place them under the relevant Tab. Otherwise they are placed under Tab 12 “Miscellaneous”. For this reason Tab 12 is not always included in the Service Manual.

For specific problems and information about procedures, look in the main index for the correct section in the manual.

Symbol key

Warning!

Indicates risk of personal injury.

Important!

Indicates risk of damage to truck.

Note!

Indicates general observations.

Safety instructions

General

Extreme importance must be placed on precautionary measures to avoid accidents during all work on the vehicle.

A general rule is always to implement preventive measures that are adapted to the type of vehicle to be worked on. The general rules below must always be observed:

- Smoking or naked flames are strictly forbidden as there is a risk of explosion in the vicinity of batteries and while working on gas equipped vehicles.
- The battery should always be protected during grinding work.
- Local fire regulations should be observed.
- Always lift the drive wheel free from the floor during service work to prevent the vehicle from moving.
- Remove the battery plug before working on the electrical system. The battery plug may only be connected while troubleshooting, and when the greatest of care is exercised, (with the truck raised).
- In order to avoid crushing injuries, always remove the battery plug when working on or around masts and hydraulic units. The mast or hydraulic unit may be actuated due to an electrical fault or a mistake while working.

⚠ ***Warning!***

Having live current connected to the truck when working on and around the mast can be fatal!

- When working on and around the lifting device and hydraulic unit, they must be locked by using the mast lock, wooden blocks or some other appropriate means.
- No other persons should be in the vicinity of the truck when it is test run in conjunction with repair work, in view of the risk of accidents or near-incidents from the truck making an unexpected manoeuvre.
- The system should not be pressurised, e.g. the pump motor shut off and the forks in lowest position, when dismantling parts of the hydraulic system.
- Remove all metal objects such as watches, chains, glasses and rings when working on the electrical system, or in its immediate vicinity. A short-circuit from such objects may result in serious burn injuries.

⚠ ***Warning!***

Great caution must be observed when dismantling the gas springs.

1. Make sure that no other persons are in the vicinity or in the lengthwise direction of the gas spring.

2. Stand to the side of the gas spring when removing.

Never point the gas spring at any person or part of the body.

Lifting the truck

Inspection/Preparations

- When the truck is lifted using a jack, make sure you secure it with blocks. The truck must not rest on the jack while work is carried out.
- Ensure that straps, wires or chains have a sufficient lifting capacity before lifting the truck.
- Ensure that the drive wheel runs free of the floor before troubleshooting the electrics.

Permitted lifting points

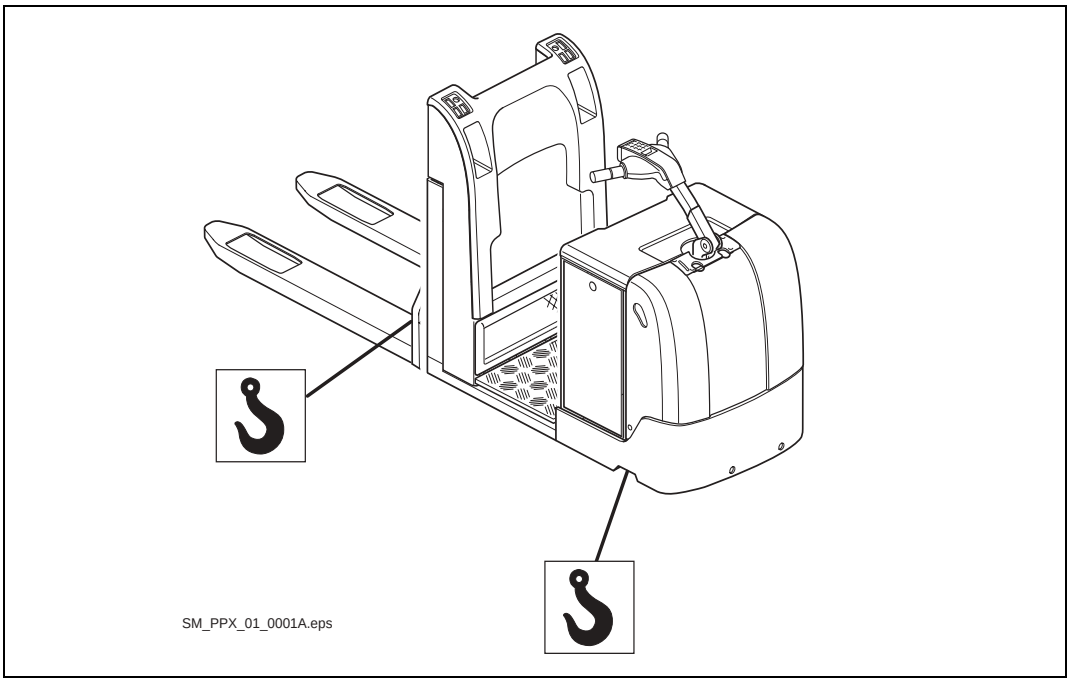

Figure 1.1 Permitted lifting points

Figure 1.1 shows where the permitted lifting points are located on the truck.

⚠ ***Warning!***

Never lift the truck using points other than those specified.

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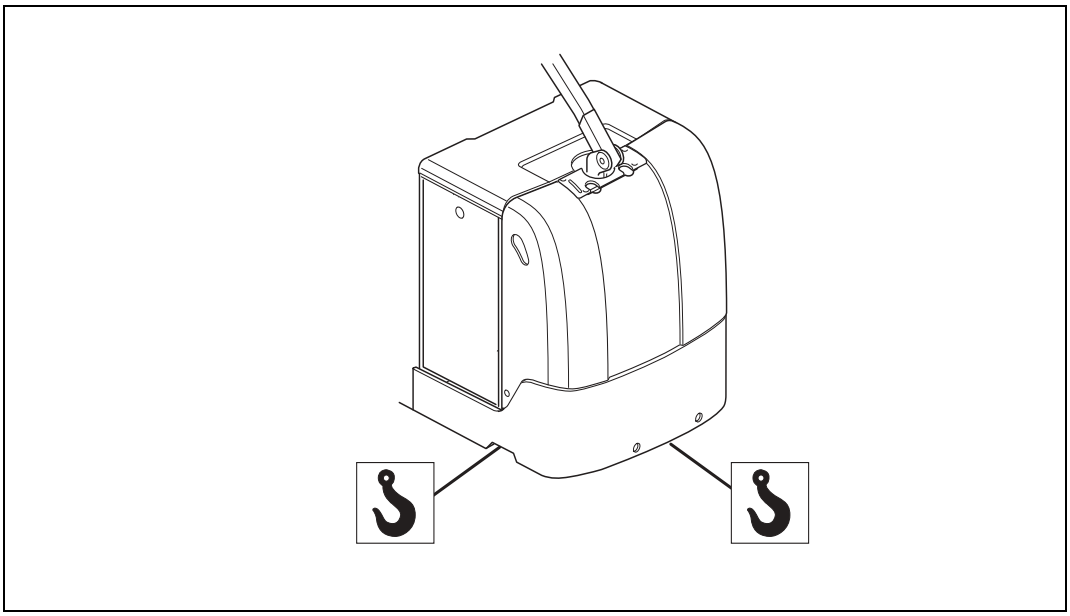


Figure 1.2 Lifting point, jack

Figure 1.2 shows where the jack is to be placed.

Welding of truck

- For welding work, always disconnect the battery plug along with all connections to controllers and regulators (applies to all electronic units). Following completion of the welding work, connect all connectors to the electronic units first, followed by the battery plug to the battery.
- Always connect the return current clamp as close to the welding area as possible to eliminate damage to surrounding components.

Atlet cares about the environment

The majority of our products consist of metal, and can be fully recycled.

Environmental impact

All products have an impact on the environment throughout their entire life cycle.

The consumption of energy during their use is one of the most important factors that influences the environment.

Through correct care, maintenance and use, the consumption of energy can be reduced, thereby alleviating the environmental impact.

Waste

Waste material in conjunction with repairs, maintenance, cleaning, or scrapping, must be collected and disposed of in an environment-friendly way and in accordance with the directives of the relevant country. Only carry out this type of work in areas intended for this purpose.

Recyclable material should be taken care of by specialists.

Environmentally hazardous waste, such as oil filters, batteries and electronics, can have a negative effect on the environment, or health, if handled incorrectly.

Preparations

Service

- Go through all safety instructions
- Make sure that you have all the essential tools close at hand before starting work.
- Before disconnecting cabling or other electrical components, check the colour codes and check for damage to cables or connections.
- When complex components are repaired and dismantled, work methodically to avoid the risk of mixing component parts.
- When repairing or maintaining sensitive components, make sure that you use clean tools and work on a clean work surface.
- Dismantle, inspect and adjust components according to the prescribed routines. See relevant Tab for detailed information.

Troubleshooting

When you suspect a faulty component, do not replace it immediately. Start by checking the surrounding equipment and then run a complete troubleshooting procedure as specified in the troubleshooting chart. Make sure you know the reason for the fault before replacing a component.

Data PP*

Designations

Truck designation

Table 1.1 Truck designations

Truck type	PPL	Low picking truck, low-lifters
	PPD	Low picking truck, low-lifters+driver-lift
	PPF	Low picking truck, fork-lift
	PPC	Low picking truck, fork-lift+driver-lift
	PPS	Low picking truck, scissor lift
	PPS D*	Low picking truck, scissor lift + operator lift
Load capacity	PPL	2000 kg
	PPD	2000 kg
	PPF	1200 kg
	PPC	1200 kg
	PPS	2000 kg

See Key to model designation on page 13.

Type designation

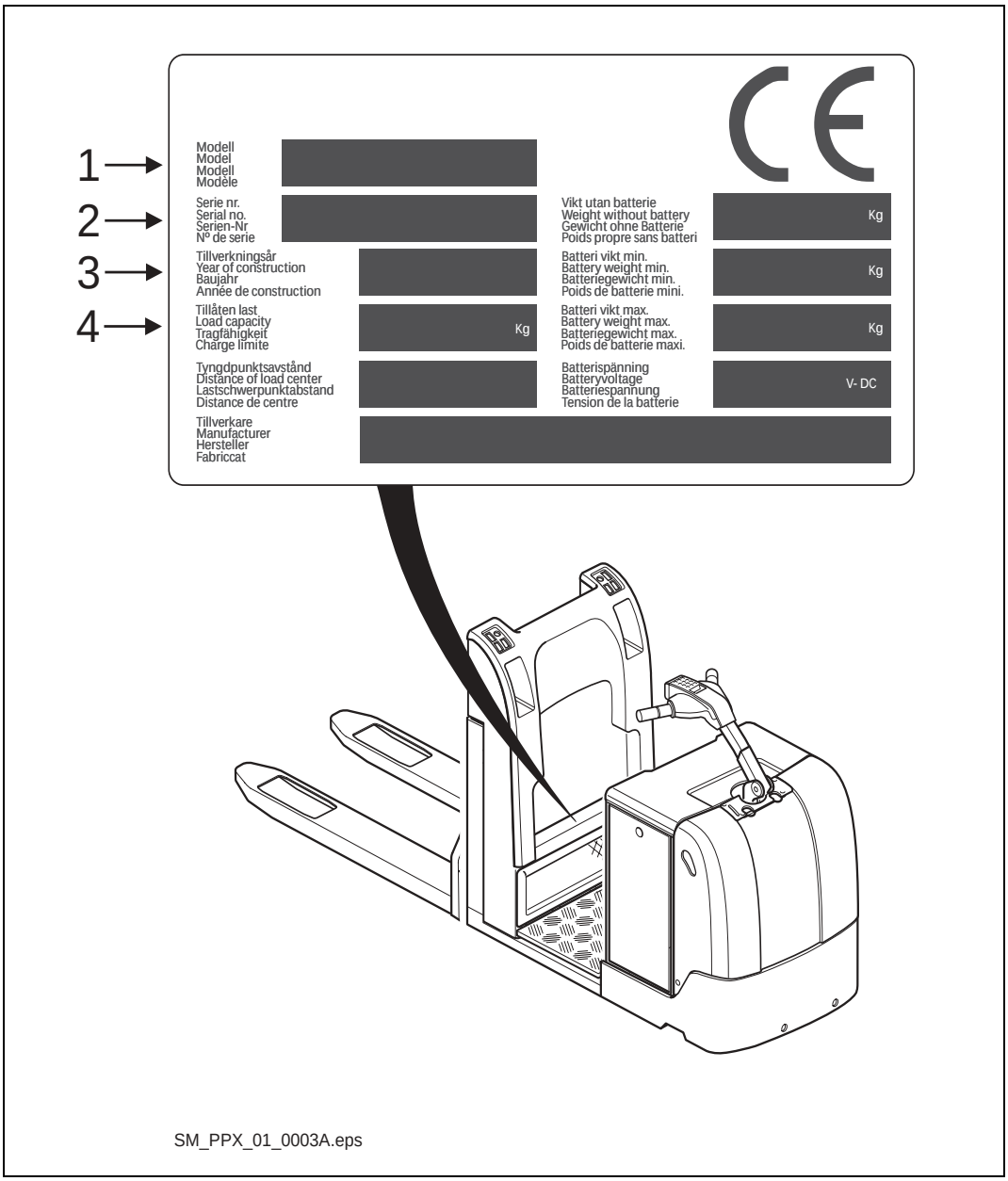


Figure 1.3 Example of identification plate (–2006w36)

1. Model designation.
2. Type Serial No./Version (S=Special design)
3. Year of manufacture, week and guarantee limit in months (providing that the service instructions in the warranty are observed).
4. Any load restrictions due to the positioning of the load on the forks (D) and/or lifting height (Q).

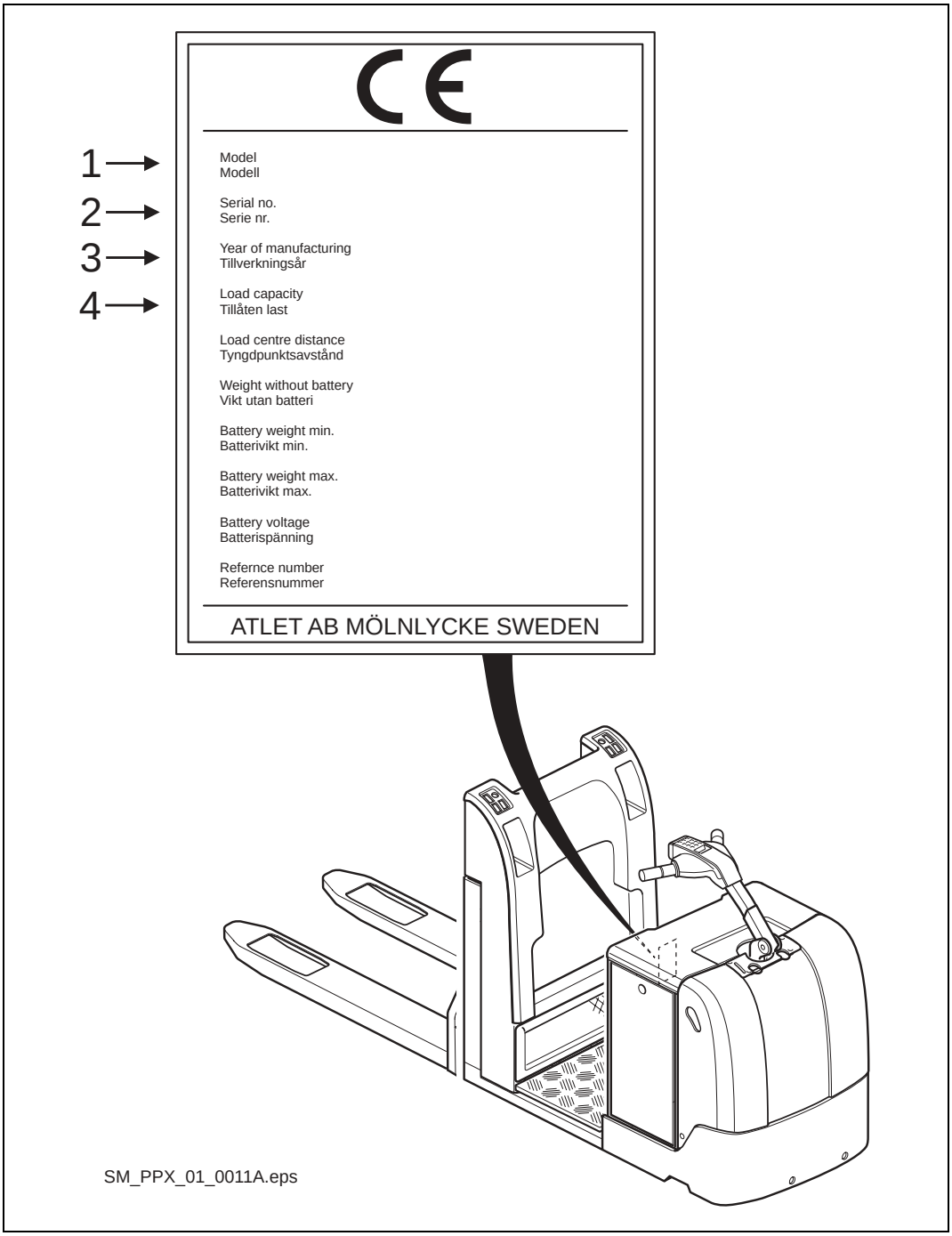


Figure 1.4 Example of identification plate (2006w37–)

1. Model designation.
2. Type Serial No./Version (S=Special design)
3. Year of manufacture, week and guarantee limit in months (providing that the service instructions in the warranty are observed).
4. Any load restrictions due to the positioning of the load on the forks (D) and/or lifting height (Q).

Note!

In cases where the machine plate has been lost or become illegible, it must be renewed immediately. In order to identify the machine's serial number, there is a plate located on each main component such as drive motor, gearbox, hydraulic unit, TMC etc. For some machines there is even a plate attached inside the battery compartment, or serial number punched on the side of the mast.

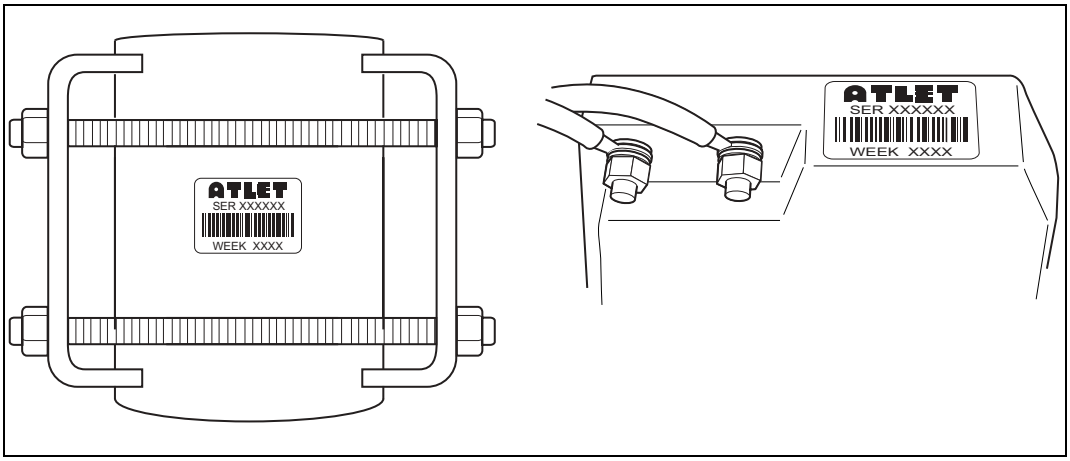


Figure 1.5 Example of plate with serial number.

Explanation of model designation

Example: **PPL T D 200**

Truck type
T=Tiller arm S=Servo
D=driver lift, only specified for PPS
Load capacity/10

Dimensions and weights

Dimensions PP*

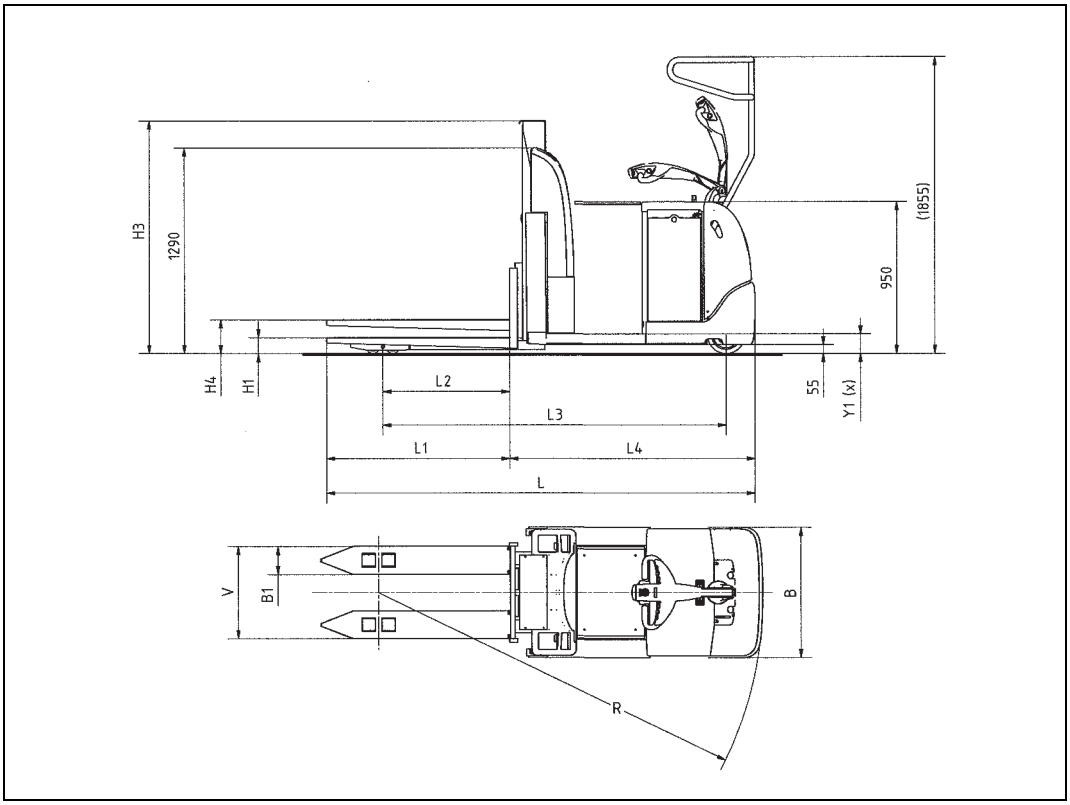


Figure 1.6 Positions for dimensions PP*

Machine specification

No.				PPL/PPD	PPF/PPC	PPS
1 1a	Lifting capacity, rated Centre of gravity distance	Q D	kg mm	2000 600	1200 600	2000 1200
2 2a 2a 2b 2c 2d	Lift height Mast height Lift height, operator lift Transport, free lift Full free lift Support arm lifting	H4 H3/H5 H2 T mast H2 DT mast	mm mm mm mm mm	230	950 1502	900 1502 950
4 4a 4b	Lifting speed without load - with rated load Lifting time without load - with rated load Lift speed, operator lift with load, 100 kg		m/s s s	0,07-0,06 2,0-2,4	0,22-0,13 4,0-6,6	0.16-0.095 5.0-8.6 2.5
5 5a	Lowering speed without load - with rated load Lowering time without load - with rated load		m/s s	0,055-0,052 2,6-2,8	0,01-0,11 8,7-7,7	0.089-0.082 9.2-9.9
6	Driving speed without load - with rated load Driving speed without load - with rated load		km/h m/s	12,0-10,0 3,3-2,8	12,0-10,5 3,3-2,9	12-10 3.3-2.8
8	Reversing capacity without load - with rated load	Max	%	15 - 7	15 - 9	15 - 9
10	Swivel radius	R2	mm	1430 + L2	1536 + L2	1536 + L2
11	Minimum aisle width, Ast incl. 200mm R2-L2+load length +200 Load length 800mm Load length 1000mm Load length 1200mm	 Ast Ast Ast	 mm mm mm			
13 13a 13b 13b 13c 13d	Height above protective roof Seat height Instep height Entry height, fixed platform - operator lift Floor height Width, gate opening	H6 H7 Y1	mm mm mm mm mm mm	123 (PPD 146)	123 (PPC 146)	123 - 146
14	Truck length	L	mm	1430 + L1	1536 + L1	1536 +L1
15 15c	Truck width Platform length	B	mm mm	790 449	790 449	790 449
16	Fork length	L1	mm	1150 - 2375	1000 - 2165	2400
17 17a	Width above fork grapples Width between forks	V	mm mm	680 / 480 V - 350	700 / 540 V - 340/350	560 V - 370
19	Truck length to the withdrawn support surface of the fork	L4	mm	1430	1536	1536
20 20a	Fork arm width - thickness Fork height, lowered	B1 H1	mm mm	175 - 55 85	170/175 - 65 85	185 - 70 85
21	Straddle lift height	H8	mm		80	
22 22a	Width between straddle lifts Width above straddle lifts	B2	mm		246/266/386 495/515/635	230 520
23	Dimensions, front axle - fork support surface	L2	mm	975 - 1465	650 - 1050	1610
24	Axle distance	L3	mm	1251 + L2	1358 + L2	1358 + L2
25	Track, front, rear		mm	500 / V - 175	500 / V-170/ 175	500 / V-185
26	Ground clearance, half of axle distance		mm	55	30	30
27	Service weight with/without battery		kg	1125 - 665	1300 - 872	1500 - 1070
28	Max. axle pressure, front without/with rated load		kg	825 - 1100	880 - 970	1050 - 1400
29	Max. axle pressure, rear without/with rated load		kg	300 - 2050	420 - 1475	450 - 2300

39 39a	Battery capacity Battery voltage		kWh Ah V	7.2-14.4 300-600 24	7.2-14.4 300-600 24	7.2-14.4 300-600 24
41	Drive motor		kW	2,2 AC	2,2 AC	2,2 AC
42	Speed control			AC Transistor	AC Transistor	AC Transistor
43 43a	Lift motor. Output/duty cycle/connec. time Hydraulic pressure		kW-%/min MPa	2.2 - 12/10 16	2.2 - 12/10 16	3.0-12-10 20
44 44a	Wheel type No. of drive/caster/load wheels			Vulkollan 2-4	Vulkollan 2-4	Solid (Vulkolan std) 2-4
45 45a 45b 45c	Wheel dimensions Load wheel D*width Drive wheel D*width Caster wheel D*width		 mm mm mm	 (4x) 85x70 (1x)230x90 (1x) 150x55	 (4x) 85x70 (1x)230x90 (1x) 150x55	 (4x) 85x70 (1x)230x90 (1x) 150x55
46	Steering system			Tiller arm	Tiller arm	Tiller arm std/ Servo
47	Travel brake type - actuated part			El. tractionm.	El. tractionm.	El. tractionm.
48	Parking brake type - actuated part			El. tractionm.	El. tractionm.	El. tractionm.

Component specifications

Table 1.2 Component specifications

Component	Specification	
Traction motor	Drive voltage Output standard	24V 2.2 kW 60 min
Gearbox	Gear ratio (standard) Oil volume	15:1 0.85 litre
Hydraulic system	Max pressure Oil volume	21 MPa max 6.0 litre
Hydraulic unit (motor and pump)	Output	2.2 kW 3,0 kW (PPS)
Control system for traction motor (TMC)	Type FZ2007 Voltage Max current	AC1 CAN 24 V 250A (RMS) in 2 min
Fuses	Operating fuse 1 pc Pump motor fuse 1 pc Traction motor fuse 1 pc	5 A 250 A 250 A
HVC	Voltage Max current, out	24 V 2A
EPS	Voltage	24 V

Table 1.2 Component specifications

Component	Specification	
	Max current	50 A
Electric brake	Braking force	25 Nm

Recommended incidental material

Oil and grease

Table 1.3 Recommended oil and grease table

Brand	Gearbox oil As per API grade GL-5		Hydraulic oil As per ISO VG 32, VG 15		Bearing grease NLGI 2 Lithium base
	Normal	Cold store	Normal (32)	Cold store (15)	
BP	BP Energear HYPO 80W/140 EP	BP Energear SHX-S 75W/140 EP	BP Bartran HV-32	BP Bartran SHF-S	Energrease LC 2
Castrol	Hypoy C 80 W/90	-	Hyspin SHS 32	Hydraulic oil OM 15 Alt: Hyspin AWH 15	LMx
Mobil	Mobilube HD 85 W/90	-	DTE 13 M SHS 32	Flowrex 1	Mobilplex 48
Shell	Spirax HD 85 W/90	-	Tellus oil TX 32	Tellus oil T 15	Retinax EP2
Statoil / Exxon	Gear way G5 80 W/90	-	SHS 32	J 26	Uniway LIX 625
Texaco	Geartex EPC 80 W/90	-	Rando oil HDZ 32	Rando oil HDZ 15	Hytex EP2

☞ ***Important!***

Do not mix different lubricants, particularly synthetic oil with mineral oil as this can affect the properties of the oil!

Standards and abbreviations

Screws

Tightening torque, bolts and nuts

Table 1.4 Tightening torque, bolts and nuts

DIM	Tensile grade			
	4.6	8.8	10.9	12.9
	Nm	Nm	Nm	Nm
M4	1.1	2.9	4.0	4.9
M5	2.2	5.7	8.1	9.7
M6	3.7	9.8	14	17
M8	8.9	24	33	40
M10	17	47	65	79
M12	30	81	114	136
M14	48	128	181	217
M16	74	197	277	333
M18	103	275	386	463
M20	144	385	541	649

The tightening torques in the table above are standard values. In some cases a specific tightening torque is specified in the relevant sections. If no tightening torque is specified in the service instructions, the values shown in the table above apply.

Bolt types and tensile grades

Table 1.5

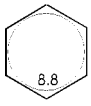
Figure	Screw type	Designation	Tensile grade
	M6S	Hexagon screw	8.8 10.9
	MC6S	Hexagon hole screw	8.8 10.9 12.9

Table 1.5

Figure	Screw type	Designation	Tensile grade
	MF6S	Hexagon hole screw, countersunk	10.9
	MCS	Slotted screw	4.6
	MVBF	Oval head screw, countersunk	4.6

Marking with the manufacturer's trademark, including the tensile grade, is compulsory for bolts with a thread diameter from 5mm and in tensile grades according to the table above. Marking only takes place when the shape of the product permits this.

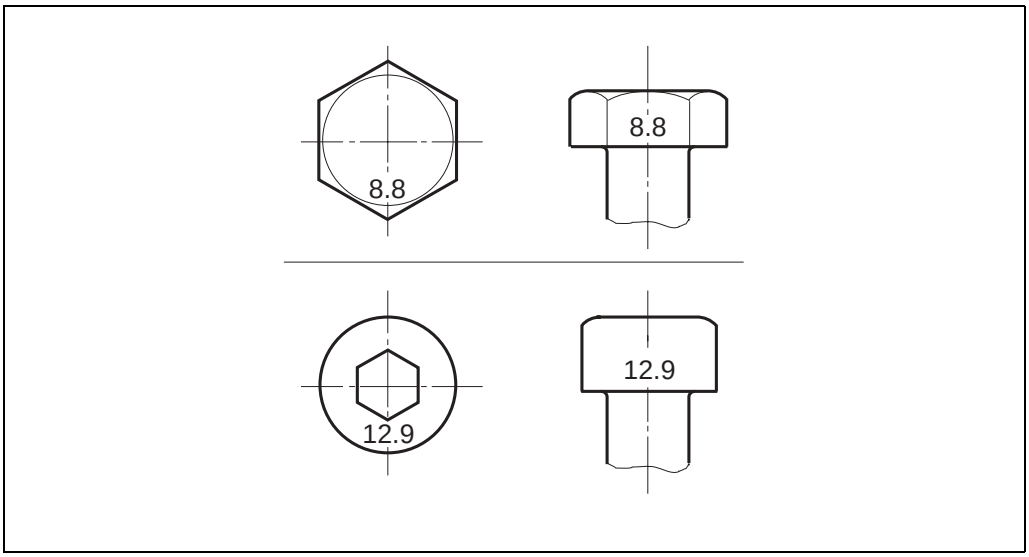


Figure 1.7 Example of marking

Tightening torque for hydraulic connections

Table 1.6 Tightening torque for hydraulic connections

Tightening torque: Pipe thread / metric threads:			
Metric fine thread	**Whitworth pipe thread**	**MA (Nm) with ring**	**MA (Nm) with elastic (O ring coupling)**
M10 x 1	G 1/8"	25	10
M12 x 1.5		30	20
M14 x 1.5	G 1/4"	50	30
M16 x 1.5	G 3/8"	80	35
M18 x 1.5		90	40
M20 x 1.5	G 1/2"	130	50
M22 x 1.5		150	60
M26 x 1.5		250	70
M27 x 1.5	G 3/4"	250	80
M27 x 2		250	90
	G 1"	350	140
M33 x 2		400	140
M42 x 2	G 11/4"	600	240
M48 x 2	G 11/2"	800	300

Conversion tables

Table 1.7 Conversion table, torque units

Newton metre (Nm)	Kilopond metre (kpm)	Pound force inch (lbg x in)	Pound force foot (lbf x ft)
1	0.10	8.85	0.74
9.81	1	86.80	7.23
0.11	0.01	1	0.08
1.36	0.14	12.00	1

Table 1.8 Conversion table, pressure units

Pa (N/m2)	Bar (1mb=1hPa)	at (kp/cm2)	dry (mm Hg, 0 C)	atm
1	10 -5	1.020*10 -5	7.501*10 -3	9.869*10 -6
9.807*10 4	0.9807	1	735.6	0.9678
133.3	1.333*10 -3	1.360*10 -3	1	1.316*10 -3
1.013*10 5	1.013	1.033	760	1

Table 1.9 Conversion, table speed

m/s	km/h
1	3.6
0.278	1

Standard abbreviations

Table 1.10 Standard abbreviations

Magnitude	Unit	Designation
Current	Ampere	A
Voltage	Volt	V
Resistance	Ohm	Ω
Output	Watt	W
Torque	Newton metre	Nm
Pressure	Pascal	Pa

Colour of truck

The truck is painted in colours with the following NCS colour designations:

Table 1.11 NCS colour designations

Truck colour	Designation
Yellow	NCS 0070-Y20R
Medium grey	NCS 7000
Dark grey	NCS 8000

Colour codes cabling

The colour coding for all the cables included in the truck are shown in Atlet's wiring diagram. The abbreviations have the following meanings:

Table 1.12 Colour codes for Atlet's wiring diagrams

Code	Cable colour
Y	Yellow
BL	Blue
SB	Black
W	White
GN	Green
GR	Grey
R	Red
BN	Brown
VO	Violet
P	Pink
OR	Orange

Note!

Two-colour cables are shown with both colour codes separated by a slash. E.g. Blue and yellow cable is shown with colour code BL/Y.

Designations

Electric components usually have a designation of two letters:

Table 1.13 First letter

Code	Designation
A	Component or function without its own letter in the list
C	Capacitor
D/V	Diode
E	Electrical component
F	Fuse
I	Indicator
K	Connector/relay
L	Coil/inductive element